

**CITY OF TENSED (PWSNO 1050026)**  
**SOURCE WATER ASSESSMENT REPORT**

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**March 3, 2003**



**State of Idaho**  
**Department of Environmental Quality**

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## Executive Summary

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency to assess every source of public drinking water for its relative sensitivity to contaminants regulated by the act. This risk assessment is based on a land use inventory in the well recharge zone, sensitivity factors associated with how the well was constructed, and aquifer characteristics.

This report, *Source Water Assessment for the City of Tensed*, describes the public drinking water well; the well recharge zone and potential contaminant sites located inside the recharge zone boundaries. This assessment, taken into account with local knowledge and concerns, should be used as a planning tool to develop and implement appropriate protection measures for this public water system. **The results should not be used as an absolute measure of risk and they should not be used to undermine public confidence in the water system.**

Drinking water for the City of Tensed, Idaho is supplied by a single ground water well located next to the city's standpipe reservoir just east of Highway 95. The Tensed community water system serves 60 connections. A ground water susceptibility analysis DEQ conducted on December 16, 2002 ranked the well at low risk for contamination. The highway and agricultural land use are the most significant potential sources of contamination in the well recharge zone.

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require education and surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

The City of Tensed already has some important drinking water protections in place. The system is well run and in compliance with *Idaho Rules for Public Drinking Water Systems*. A fence protects the wellhead and sanitary setback zone.

A voluntary measure Tensed should consider is writing an emergency response plan. Drinking water protection partnerships with landowners in the recharge zone, and governmental agencies may also be useful. For instance ground water protection activities related to agriculture, an important land use in the Tensed well field recharge zone, could be coordinated through the tribe, the state department of agriculture or the Natural Resource Conservation Service.

Due to the time involved with the movement of ground water, source water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. For assistance in developing protection strategies, please contact your regional Department of Environmental Quality office or the Idaho Rural Water Association.

# SOURCE WATER ASSESSMENT FOR CITY OF TENSED

## Section 1. Introduction - Basis for Assessment

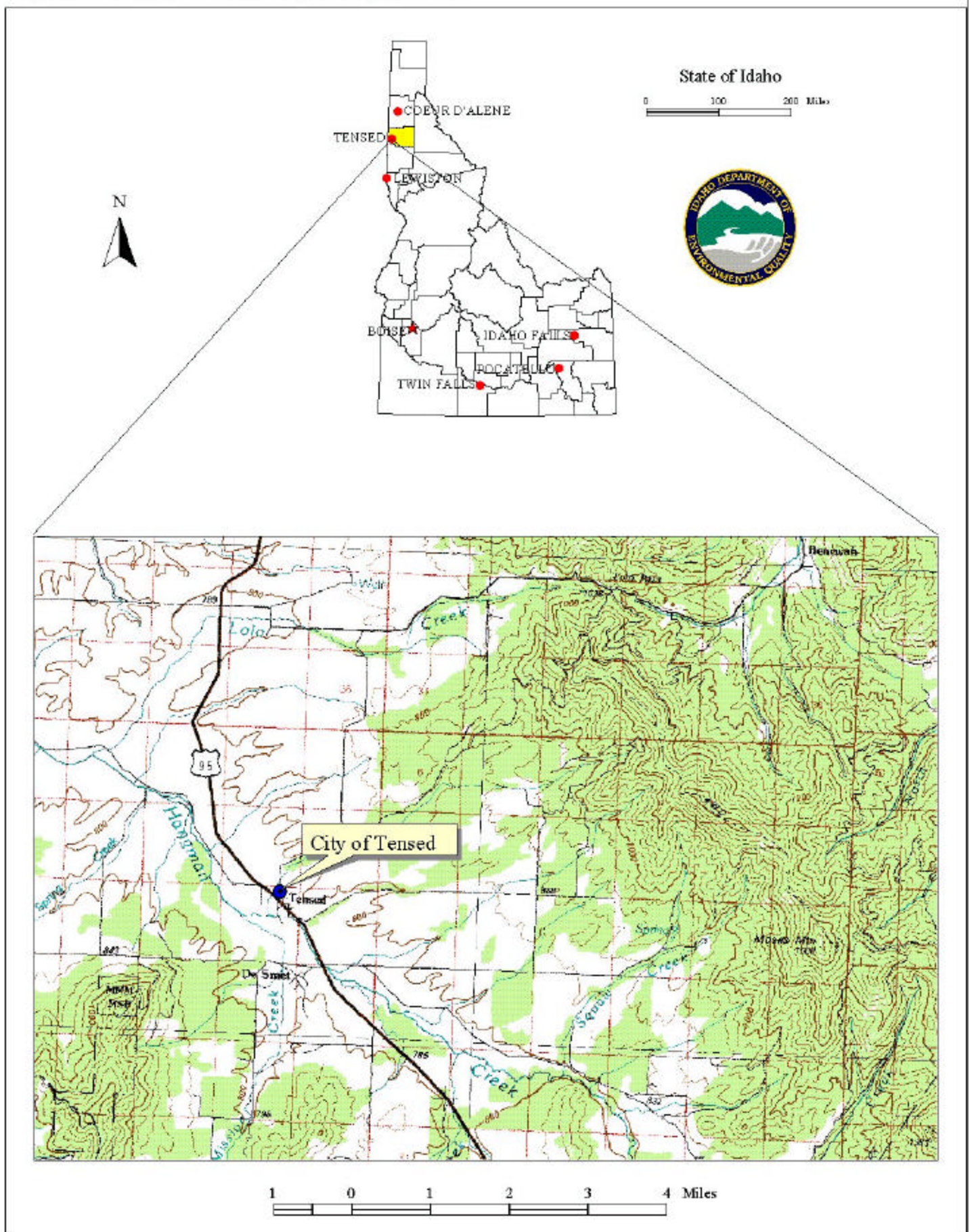
The following sections contain information necessary for understanding how and why this assessment was conducted. **It is important to review this information to understand what the ranking of this source means.** A map showing the delineated source water assessment area and an inventory of significant potential sources of contamination identified within that area are included. The ground water Susceptibility Analysis Worksheet used to develop this assessment is attached.

### Level of Accuracy and Purpose of the Assessment

The Idaho Department of Environmental Quality (DEQ) is required by the U.S. Environmental Protection Agency (EPA) to assess every public drinking water source in Idaho for its relative susceptibility to contaminants regulated by the Safe Drinking Water Act. These assessments are based on a land use inventory inside the delineated recharge zones, sensitivity factors associated with how the well is constructed, and aquifer characteristics. The state must complete more than 2900 assessments by May of 2003. Because resources and the time available to accomplish assessments are limited, an in-depth, site-specific investigation for every public water system is not possible.

**The results of the source water assessment should not be used as an absolute measure of risk and they should not be used to undermine public confidence in the water system.** The ultimate goal of this assessment is to provide data to local communities for developing a protection strategy for their drinking water supply. The Idaho Department of Environmental Quality recognizes that pollution prevention activities generally require less time and money to implement than treating a public water supply system once it has been contaminated. DEQ encourages communities to balance resource protection with economic growth and development. The decision as to the amount and types of information necessary to develop a source water protection program should be determined by the local community based on its own needs and limitations. Wellhead or source water protection is one facet of a comprehensive growth plan, and it can complement ongoing local planning efforts.

Figure 1. Geographic Location of the City of Tensed



## **Section 2. Preparing for the Assessment**

### **Defining the Zones of Contribution - Delineation**

The delineation process establishes the physical area around a well that will become the focal point of the assessment. The process includes mapping the boundaries of the well recharge area into time of travel zones indicating the number of years necessary for a particle of water flowing through the aquifer to reach a well. DEQ used a refined computer model approved by the EPA to determine the extent of the recharge zone and to divide it into time of travel (TOT) zones. The computer model used data assimilated by DEQ from a variety of sources including local well logs.

The City of Tensed is located beside Highway 95 in the southern part of Benewah County Idaho, and is on the Coeur d'Alene Indian Reservation. (Figure 1). A 290-foot deep well, capable of producing about 220 gallons per minute, supplies water for domestic consumption and fire protection. Wells in the Tensed area are either flowing artesian or have confined pressure putting the water table within 10 feet of the surface.

The recharge zone delineated for the City of Tensed well encompasses about 4180 acres divided into 0 to 3 and 3 to 6 year time of travel zones (Figure 2). Computer simulations showed the flow paths reaching the boundary of the watershed. The primary direction of ground water flow is from the northeast toward the well. The location of the well near the confluence of a tributary to Hangman Creek and local area well logs imply that flow is towards the creek. Most of the City of Tensed lies within the 0-3 year time of travel zone.

### **Identifying Potential Sources of Contamination**

The goal of the inventory process is to locate and describe those facilities, land uses, and environmental conditions that are potential sources of ground water contamination. Inventories for all public water systems in Idaho were conducted in two-phases. The first phase involved identifying and documenting potential contaminant sources within a system's source water assessment area through the use of computer databases and Geographic Information System maps developed by DEQ. Maps showing the delineations and tables summarizing the results of the database search were then sent to system operators for review and correction during the second or enhanced phase of the inventory process. Information from the public water system file was also incorporated into the potential contaminant inventory.

Figure 2, *City of Tensed Delineation and Potential Contaminant Inventory* of this report shows the location of the well, the zone of contribution DEQ delineated for it, and potential contaminant sites in the vicinity. Cropland and undeveloped forest are the predominant land uses outside of the town.

Many potential sources of contamination are regulated at the federal level, state level, or both to reduce the risk of release. When a business, facility, or property is identified as a potential contaminant source, this should not be interpreted to mean that this business, facility, or property is in violation of any local, state, or federal environmental law or regulation. What it does mean is that the potential for contamination exists due to the nature of the business, industry, or operation.

### Section 3. Susceptibility Analysis

The susceptibility to contamination of all ground water sources in Idaho is being assessed on the following factors:

- physical integrity of the well,
- hydrologic characteristics,
- land use characteristics, and potentially significant contaminant sources
- historic water quality

The susceptibility rankings are specific to a particular potential contaminant or category of contaminants. A high susceptibility rating relative to one potential contaminant does not mean that the water system is at the same risk for all other potential contaminants. The relative ranking that is derived for each well is a qualitative, screening-level step that, in many cases, uses generalized assumptions and best professional judgement. The following summaries describe the rationale for the susceptibility ranking. The Susceptibility Analysis Worksheet for the City of Tensed well, Attachment A, shows in detail how the well was scored.

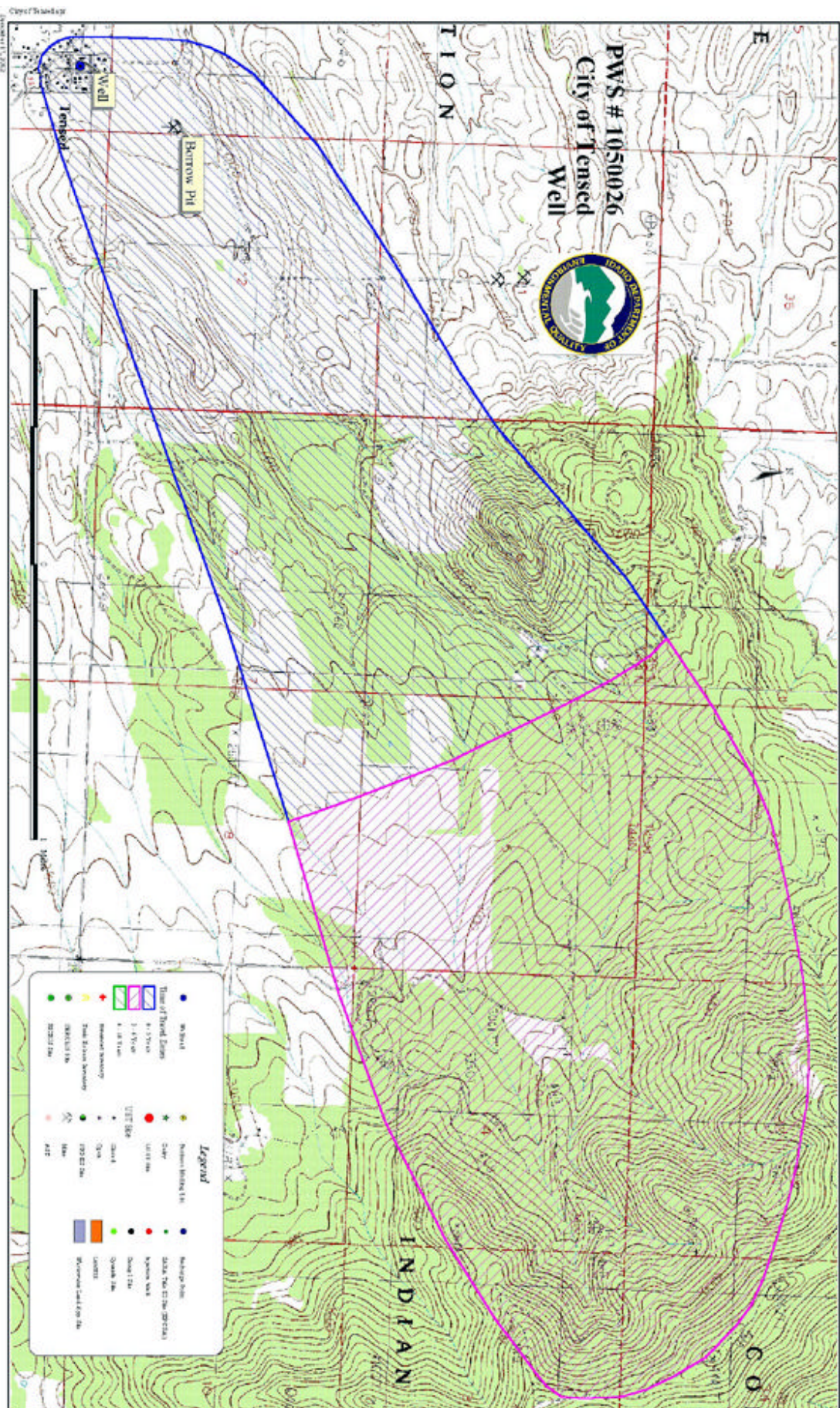
#### **Well Construction**

Well construction directly affects the ability of the wells to protect the aquifer from contaminants. Lower scores imply a well that can better protect the water. This portion of the susceptibility analysis relies on information from individual well logs and from the most recent sanitary survey of the public water system. The driller's report for the City of Tensed well is on file with DEQ. The water system was in substantial compliance with *Idaho Rules for Public Drinking Water Systems* when it was inspected in June 2002. No serious deficiencies were noted in wellhead and surface seal maintenance, but the well did need to be vented to provide an air release to the well that would prevent splashing into the electrical conduit and main controls for the well.

The City of Tensed well was drilled in 1986 to a depth of 290 feet. Except for a minor variation in the casing wall thickness the well meets current Idaho Department of Water Resources well construction standards. The 10-inch steel casing extends from a foot above ground to 230 feet. The bottom 60 feet of the well bore is free standing in basalt. The well seal is 40 feet deep, terminating in a clay stratum. Artesian pressure raises the static water level in the well to 8 feet below the surface. First water, encountered between 222 and 227 feet, was cased off. A layer of broken basalt 235 feet below the surface produces 20 gallons per minute. The principal production stratum is another seam of broken basalt 288 feet below the surface. The total capacity of the well is about 220 gallons per minute.



Figure 2. City of Tensed Delineation and Potential Contaminant Inventory.



## **Hydrologic Sensitivity**

Hydrologic sensitivity scores reflect natural geologic conditions at the well site and in the recharge zone. Information for this part of the analysis is derived from individual well logs and from the soil drainage classification inside the delineation boundaries. The City of Tensed wells scored 2 points out of 6 points possible in the hydrologic sensitivity portion of the susceptibility analysis.

Soils in the recharge zone near the well are classed as poorly to moderately well drained, while soils in the 3-6 year time of travel zone are moderately well to well drained. Soils that drain slowly are deemed more protective of ground water than quickly draining soils. At the well site a single 4-foot deep seam of gravel near the surface and about 200 feet of clay lie over the water table. The thick clay beds are considered an aquitard capable of inhibiting vertical migration of contaminants into the ground water.

## **Potential Contaminant Sources and Land Use**

Figure 2, *City of Tensed Delineation and Potential Contaminant Inventory* on page 7 shows the location of the City of Tensed wellfield, and the recharge zone DEQ delineated for it. Land use inside the 0 to 3-year time of travel zone is urban near the well and cropland outside of the town. Cropland and undeveloped forest characterize land use in the 3-6 year time of travel zone. Highway 95 crosses the 0-3 year time of travel zone. As a heavily traveled trucking route, the highway is a potential source of every class of regulated contaminant. A borrow pit in the 0-3 year time of travel zone is probably not a significant potential contaminant source, but it should be checked from time to time for signs of illegal dumping.

## **Historic Water Quality**

The City of Tensed has had few water quality problems other than episodes of total coliform contamination. A series of positive total coliform bacteria results in 2002 was probably due to use of a frost-free hydrant as a sampling location. Iron and manganese are present in concentrations high enough to cause sediment buildup in the distribution system, but are not a health threat. Water quality test results are summarized on the table below.

**Table 1. City of Tensed Chemical Sampling Results**

Primary IOC Contaminants (Mandatory Tests)							
Contaminant	MCL (mg/l)	Results (mg/l)	Dates	Contaminant	MCL (mg/l)	Results (mg/l)	Dates
Antimony	0.006	*ND	12/7/98, 12/31/01	Nitrate	10	ND to 0.077	2/7/85 to 12/31/01
Arsenic	0.01	ND	7/11/86 to 12/31/01	Nickel	N/A	ND	12/7/98 to 12/31/01
Barium	2	ND to 0.01	7/11/86 to 12/31/01	Selenium	0.05	ND	12/7/98 to 12/31/01
Beryllium	0.004	ND	12/7/98 to 12/31/01	Sodium	N/A	11.8 to 16.0	2/7/85 to 12/31/01
Cadmium	0.005	ND	7/11/86 to 12/31/01	Thallium	0.002	ND	12/7/98 to 12/31/01
Chromium	0.1	ND	7/11/86 to 12/31/01	Cyanide	0.02	ND	1/12/96
Mercury	0.002	ND	7/11/86 to 12/31/01	Fluoride	4.0	ND to 0.4	7/11/86 to 12/31/01



**Table 1. City of Tensed Chemical Sampling Results continued**

<b>Secondary and Other IOC Contaminants (Optional Tests)</b>			
Contaminant	Recommended Maximum (mg/l)	Results (mg/l)	Dates
Manganese		0.08 to 0.23	2/7/85, 7/11/86
Iron		0.22 to 4.5	2/7/85, 7/11/86
<b>Regulated and Unregulated Synthetic Organic Chemicals</b>			
Contaminant		Results	Dates
29 Regulated and 13 Unregulated Synthetic Organic Compounds		None Detected	12/8/93 to 7/29/02
<b>Regulated and Unregulated Volatile Organic Chemicals</b>			
Contaminant		Results	Dates
21 Regulated And 16 Unregulated Volatile Organic Compounds		None Detected	3/7/94 , 12/7/98
<b>Radiological Contaminants</b>			
Contaminant	MCL	Results	Dates
Gross Alpha, Including Ra & U	15 pC/l	ND to 1.5 pC/l	4/28/87 to 12/31/01
Gross Beta Particle Activity	4 mrem/year	2.4, 7.5 mrem 1.7 pC/l	4/28/87, 1/12/96 12/31/01

\*ND = not detected

### **Final Susceptibility Ranking**

The City of Tensed well has a low susceptibility to contamination. The well was constructed to current standards in an area where deep clay soils provide a natural barrier against migration of contaminants toward the well. Agricultural land use and Highway 95 are the most significant potential sources of contamination documented inside the community's well recharge zone.

The final scores for the susceptibility analysis were determined using the following formulas:

- 1) VOC/SOC/IOC Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.2)
- 2) Microbial Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.35)

The final ranking categories are as follows:

- 0 - 5 Low Susceptibility
- 6 - 12 Moderate Susceptibility
- > 13 High Susceptibility

**Table 2. Summary of City of Tensed Susceptibility Evaluation**

<b>Cumulative Susceptibility Scores</b>						
Well Name	System Construction	Hydrologic Sensitivity	Contaminant Inventory			
			IOC	VOC	SOC	Microbial
Well #1	0	2	10	10	10	8
<b>Final Susceptibility Scores/Ranking</b>						
	IOC	VOC	SOC	Microbial		
Well #1	4/Low	4/Low	4/Low	4/Low		

IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

## Section 4. Options for Source Water Protection

The susceptibility assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what the susceptibility ranking a source receives, protection is always important. Whether the source is currently located in a “pristine” area or an area with numerous industrial and/or agricultural land uses that require education and surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

The City of Tensed already has some significant drinking water protections in place. The well is located in a fenced area that protects sanitary setback zone from uses that can degrade ground water quality. The fence also deters vandalism to the wellhead. The city operates and maintains the water system in compliance with the *Idaho Rules for Public Drinking Water Systems*, and tests the water regularly for microbial and chemical contaminants. It might be helpful to develop a written maintenance and testing handbook to help new personnel avoid mistakes like drawing samples from the hydrant.

A voluntary measure every system should implement is development of a water emergency response plan. There is a simple fill-in-the-blanks form available on the DEQ website to guide systems through the process. Periodic reviews of land use inside the recharge zone should also be undertaken, and changes noted on a map of the area, since an up to date potential contaminant inventory is a useful planning tool.

Drinking water protection partnerships with landowners in the recharge zone, and governmental agencies may also be useful. For instance ground water protection activities related to agriculture, an important land use in the Tensed well field recharge zone, could be coordinated through the tribe, the state department of agriculture or the Natural Resource Conservation Service.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term.

## **Assistance**

Public water suppliers and users may call the following IDEQ offices with questions about this assessment and to request assistance with developing and implementing a local protection plan. In addition, draft protection plans may be submitted to the IDEQ office for preliminary review and comments.

Coeur d'Alene Regional DEQ Office (208) 769-1422

State IDEQ Office (208) 373-0502

Website: [www.deq.state.id.us](http://www.deq.state.id.us)

Water suppliers serving fewer than 10,000 persons may contact Melinda Harper of the Idaho Rural Water Association (208) 343-7001 for assistance with drinking water protection plans. [www.idahoruralwater.com](http://www.idahoruralwater.com)

## **References Cited**

Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers, 1997. "Recommended Standards for Water Works."

Idaho Department of Agriculture, 1998. Unpublished Data.

Idaho Department of Environmental Quality, 1997. Design Standards for Public Drinking Water Systems. IDAPA 58.01.08.550.01.

Idaho Department of Water Resources, 1993. Administrative Rules of the Idaho Water Resource Board: Well Construction Standards Rules. IDAPA 37.03.09.

Idaho Department of Environmental Quality, 2002. Coeur d'Alene Regional Office Technical Services Delineations Draft Report.

## Attachment A

### City of Tensed Susceptibility Analysis Worksheet



## Ground Water Susceptibility

Public Water System Name : CITY OF TENSED

Source: WELL #1

Public Water System Number : 1050026

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1. System Construction		SCORE			
Drill Date	7/12/86				
Driller Log Available	YES				
Sanitary Survey (if yes, indicate date of last survey)	YES 2002				
Well meets IDWR construction standards	YES	0			
Wellhead and surface seal maintained	YES	0			
Casing and annular seal extend to low permeability unit	YES	0			
Highest production 100 feet below static water level	YES	0			
Well located outside the 100 year flood plain	YES	0			
<b>Total System Construction Score</b>		<b>0</b>			
2. Hydrologic Sensitivity					
Soils are moderately drained to well drained	About 50 %	1			
Vadose zone composed of gravel, fractured rock or unknown	NO	0			
Depth to first water > 300 feet	NO	1			
Aquitard present with > 50 feet cumulative thickness	YES	0			
<b>Total Hydrologic Score</b>		<b>2</b>			
		IOC	VOC	SOC	Microbial
3. Potential Contaminant / Land Use		Score	Score	Score	Score
Land Use	CROPLAND	2	2	2	2
Farm chemical use high	NO	0	0	0	
IOC, VOC, SOC, or Microbial sources in Sanitary Setback	NO	NO	NO	NO	NO
<b>Potential Contaminant Source/Land Use Score</b>		<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>
Potential Contaminant / Land Use - 3 YR. TOT					
Contaminant sources present (Number of Sources)	YES, HIGHWAY 95, CITY	2	2	2	2
(Score = # Sources X 2 ) 8 Points Maximum		4	4	4	4
Sources of Class II or III leacheable contaminants or Microbials	YES	2	2	2	
4 Points Maximum		2	2	2	
Zone 1B contains or intercepts a Group 1 Area	NO	0	0	0	0
Land use 3 Yr. TOT	Greater Than 50% Non-Irrigated Agricultural Land	2	2	2	2
<b>Total Potential Contaminant Source / Land Use Score - Zone 1B</b>		<b>8</b>	<b>8</b>	<b>8</b>	<b>6</b>
Potential Contaminant / Land Use - 6 YR. TOT					
Contaminant Sources Present	NO	0	0	0	
Sources of Class II or III leacheable contaminants or Microbials	NO	0	0	0	
Land Use 6 Yr. TOT	Less than 25% Agricultural Land	0	0	0	
<b>Potential Contaminant Source / Land Use Score - 6 Yr. TOT</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
Potential Contaminant / Land Use -10 YR. TOT					
Contaminant Source Present	NA	0	0	0	
Sources of Class II or III leacheable contaminants or Microbials	NA	0	0	0	
Is there irrigated agricultural lands that occupy > 50% of Zone	NA	0	0	0	
<b>Total Potential Contaminant Source / Land Use Score 10 YR. TOT</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Cumulative Potential Contaminant / Land Use Score</b>		<b>10</b>	<b>10</b>	<b>10</b>	<b>8</b>
<b>4. Final Susceptibility Source Score</b>		<b>4</b>	<b>4</b>	<b>4</b>	<b>5</b>
<b>5. Final Well Ranking</b>		Low	Low	Low	Low

## POTENTIAL CONTAMINANT INVENTORY

### LIST OF ACRONYMS AND DEFINITIONS

**AST (Aboveground Storage Tanks)** – Sites with aboveground storage tanks.

**Business Mailing List** – This list contains potential contaminant sites identified through a yellow pages database search of standard industry codes (SIC).

**CERCLIS** – This includes sites considered for listing under the **Comprehensive Environmental Response Compensation and Liability Act (CERCLA)**. CERCLA, more commonly known as ? Superfund? is designed to clean up hazardous waste sites that are on the national priority list (NPL).

**Cyanide Site** – DEQ permitted and known historical sites/facilities using cyanide.

**Dairy** – Sites included in the primary contaminant source inventory represent those facilities regulated by Idaho State Department of Agriculture (ISDA) and may range from a few head to several thousand head of milking cows.

**Deep Injection Well** – Injection wells regulated under the Idaho Department of Water Resources generally for the disposal of stormwater runoff or agricultural field drainage.

**Enhanced Inventory** – Enhanced inventory locations are potential contaminant source sites added by the water system. These can include new sites not captured during the primary contaminant inventory, or corrected locations for sites not properly located during the primary contaminant inventory. Enhanced inventory sites can also include miscellaneous sites added by the Idaho Department of Environmental Quality (DEQ) during the primary contaminant inventory.

**Floodplain** – This is a coverage of the 100year floodplains.

**Group 1 Sites** – These are sites that show elevated levels of contaminants and are not within the priority one areas.

**Inorganic Priority Area** – Priority one areas where greater than 25% of the wells/springs show constituents higher than primary standards or other health standards.

**Landfill** – Areas of open and closed municipal and non-municipal landfills.

**LUST (Leaking Underground Storage Tank)** – Potential contaminant source sites associated with leaking underground storage tanks as regulated under RCRA.

**Mines and Quarries** – Mines and quarries permitted through the Idaho Department of Lands.)

**Nitrate Priority Area** – Area where greater than 25% of wells/springs show nitrate values above 5mg/l.

**NPDES (National Pollutant Discharge Elimination System)** – Sites with NPDES permits. The Clean Water Act requires that any discharge of a pollutant to waters of the United States from a point source must be authorized by an NPDES permit.

**Organic Priority Areas** – These are any areas where greater than 25 % of wells/springs show levels greater than 1% of the primary standard or other health standards.

**Recharge Point** – This includes active, proposed, and possible recharge sites on the Snake River Plain.

**RICRIS** – Site regulated under **Resource Conservation Recovery Act (RCRA)**. RCRA is commonly associated with the cradle to grave management approach for generation, storage, and disposal of hazardous wastes.

**SARA Tier II (Superfund Amendments and Reauthorization Act Tier II Facilities)** – These sites store certain types and amounts of hazardous materials and must be identified under the Community Right to Know Act.

**Toxic Release Inventory (TRI)** – The toxic release inventory list was developed as part of the Emergency Planning and Community Right to Know (Community Right to Know) Act passed in 1986. The Community Right to Know Act requires the reporting of any release of a chemical found on the TRI list.

**UST (Underground Storage Tank)** – Potential contaminant source sites associated with underground storage tanks regulated as regulated under RCRA.

**Wastewater Land Applications Sites** – These are areas where the land application of municipal or industrial wastewater is permitted by DEQ.

**Wellheads** – These are drinking water well locations regulated under the Safe Drinking Water Act. They are not treated as potential contaminant sources.

**NOTE:** Many of the potential contaminant sources were located using a geocoding program where mailing addresses are used to locate a facility. Field verification of potential contaminant sources is an important element of an enhanced inventory.

Where possible, a list of potential contaminant sites unable to be located with geocoding will be provided to water systems to determine if the potential contaminant sources are located within the source water assessment area.